Installation and service instructions

for heating engineers

Vitoplex 100-LS
Type SXD, 0.26 to 0.7 t/h
Oil/gas fired boiler
Steam generator up to 1 bar operating pressure

VITOPLEX 100-LS

5692 729 GB 4/2007

Please keep safe

Safety instructions

⚠ *Please follow these safety instructions closely to prevent accidents and material losses.*

If you smell gas
- Do not smoke! Do not use naked flames or cause sparks (e.g. by switching lights or electrical appliances ON or OFF)
- Open windows and doors
- Close gas shut-off valve
- Notify your heating engineer/ installation contractor from outside the building
- Observe the safety regulations of your gas supplier (see gas meter) and of your local heating contractor (see commissioning/ training report).

In an emergency
- Immediately switch OFF emergency stop switch (outside boiler room) (except if you smell gas).
- Close the shut-off valves of the main fuel lines.
- For fire, use an appropriate fire extinguisher.

Work on the equipment
Installation, initial start-up, inspection, maintenance and repairs must only be carried out by a competent person (heating engineer/installation contractor).

Before working on equipment/ heating system, isolate its mains electrical supply (e.g. by removing a separate mains fuse or by means of a mains electrical isolator) and safeguard against unauthorised reconnection.

When using gas as fuel, also close main gas shut-off valve and safeguard against unauthorised reopening.

Installation of additional components
Installation of additional components which have not been tested together with the boiler can adversely affect the boiler function.
Our warranty does not cover and we accept no liability for damage caused by the installation of such components.

Boiler room conditions
- Do not use where air is polluted with halogenated hydrocarbons (e.g. as in aerosols, paints, solvents and cleaning agents)
- Prevent very dusty conditions
- Avoid rooms with permanently high levels of humidity
- Room should be frost protected
- Ensure good ventilation, and never close any vents.

Work on gas equipment
This must only be carried out by an approved contractor.
Please observe all commissioning work for gas installations specified according to TRGI or TRF, or local regulations.

Repair work
It is not permitted to carry out repairs on parts that fulfil a safety function.
Use only original Viessmann spare parts, or equivalent parts that have been approved by Viessmann.

Initial start-up
Initial start-up must be carried out by the system installer or a designated commissioning engineer. All actual values should be recorded in a commissioning/service report.

Instructing the system user
The system installer must hand the operating instructions to the system user and instruct him/her in the operation of the system.

⚠ ***Safety instruction***
In this instruction manual, this heading denotes information which must be observed to prevent accidents and material losses.

⚠ *This symbol denotes information which must be observed to prevent material losses.*

5692 729 GB

Index

Page

General information
Safety instructions 2
Notice of completion 3

Initial start-up, inspection and maintenance
Steps 4
Further details regarding the individual steps 6

Troubleshooting
Diagnostics 18

Parts list 21

Appendix
Water quality requirements according to TRD 701 26
Specification 27
Commissioning/service report 28
Declaration of conformity 29
Manufacturer's certificate 30
Keyword index 31

Notice of completion

Within four weeks of the initial commissioning of the combustion equipment, the operator must notify the local chimney sweep accordingly [in Germany; check local regulations].

5692 729 GB

Steps – initial start-up, inspection and maintenance

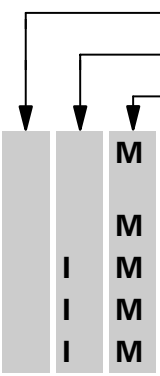
For further instructions on individual steps, see pages indicated.

Commissioning steps
Inspection steps
Maintenance steps

C	I	M		Page
C		M	**1. Adjusting pressure regulator and pressure limiter**	6
C		M	**2. System start-up**	7
		M	**3. System shutdown**	8
	I	M	**4. Closing the Vitoair draught stabiliser (if installed)**	9
		M	**5. Opening the boiler door and the clean-out cover**	9
		M	**6. Removing and cleaning the turbulators**	10
		M	**7. Cleaning heating surface, flue outlet and flue pipe**	11
	I	M	**8. Checking all seals/gaskets and packing cords on flue gas side**	
		M	**9. Checking thermal insulation of boiler door**	
		M	**10. Inserting the turbulators**	12
		M	**11. Securing the boiler door and clean-out cover**	13
		M	**12. Checking the water chamber for deposits**	14
		M	**13. Cleaning the multiple level electrode**	15
		M	**14. Cleaning the water level indicator**	15
		M	**15. Checking all connections at the water and steam sides, the sensor well and the inspection ports for leaks after filling the boiler**	16
	I	M	**16. Cleaning the sight glass in the boiler door**	16
	I	M	**17. Checking the Vitoair draught stabiliser (if installed)**	17
		M	**18. Adjusting the burner**	17
	I	M	**19. Checking the safety valve**	17
	I	M	**20. Checking the safety and control equipment**	

5692 729 GB

Steps – initial start-up, inspection and maintenance (cont.)



				Page
		M	**21. Checking the pressure regulator, pressure limiter and thermostat (standby)**	17
		M	**22. Checking the water quality**	26
	I	M	**23. Checking thermal insulation**	
	I	M	**24. Checking the boiler room ventilation**	
	I	M	**25. Checking the flue pipe for leaks**	

5692 729 GB

Further details regarding the individual steps

Maintenance instructions
We recommend that your boiler system is maintained regularly by a heating specialist to ensure fault-free, energy-conscious and environmentally safe operation of your heating system.

Your boiler must be cleaned at regular intervals, otherwise the flue gas temperature rises with increasing contamination, which leads to higher energy losses.

We recommend the use of a flue gas thermometer.
Monitoring the flue gas temperature highlights incorrect burner settings and the level of boiler contamination.

Excessive flue gas temperatures through boiler contamination or incorrect burner setting reduces the system efficiency. Where necessary, clean the boiler or adjust the burner settings.

Adjusting the pressure regulator and pressure limiter

1. Adjust the pressure limiter response pressure a little higher than that of the pressure regulator.

2. Secure the protective cap again on the pressure limiter to prevent any unauthorised adjustment at a later time.

3. During commissioning, adjust the pressure regulator to the required operating pressure.
Do not alter this setting later.

Adjust the pressure regulator for stage 1 a little higher and a little lower for stage 2.

Note
Each pressure regulator is equipped with a setting screw each for adjusting the switching point (e.g. 0.45 bar) and for selecting the switching differential (e.g. 0.02 bar), i.e., the pressure regulator starts the burner at 0.43 bar and switches it OFF at 0.45 bar.

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Further details regarding the individual steps (cont.)

*According to the [German] Health & Safety at Work Act, steam boilers with a safety pressure in **excess of 0.5 bar** must be monitored. In accordance with the conformity assessment diagram no. 5 of the EU Pressure Equipment Directive, these boilers must be categorised as class III. Prior to commissioning, this system must be tested by an authorised body (e.g. TÜV).*

System start-up

Observe the information provided by the suppliers of burner and accessories.

1. Check that turbulators are fully pushed into hot gas flues (against their end stop) (open boiler door).
2. Check that the boiler room ventilation is unobstructed.
3. Check the function of the water treatment system.
4. Fill the steam boiler with water higher than the NW indicator.

   Note
   Only operate steam boilers with suitable water; see also water quality requirements on page 26.
5. Check all fitted components, such as pipework, valves, regulators, pumps etc. for function and leaks.
6. Check the fuel oil level or the gas supply pressure.
7. Open the flue gas damper (where appropriate).
8. Check whether cleaning aperture on the flue outlet is closed.
9. Open the shut-off valves in oil supply pipes (at the oil tank and filter) or open the gas shut-off valve, whichever is applicable.
10. Switch ON the mains electrical isolator, the switch for the feed water pump and the burner ON/OFF switch, in that order.

Burner manufacturer's operating instructions

11. Start the boiler with a low output (burner stage 1 or partial load) and slowly ramp up to the required operating pressure.
12. Slowly open the steam valve after the required operating pressure has been reached.
13. Only enable the full burner load at that point.
14. While the system heats up, check the correct function of all control and safety equipment.
15. Observe the pressure and temperature test equipment.
16. Check the fittings for leaks and tighten, if necessary.
17. Check the boiler door and clean-out cover after approx. 50 hours and retighten all screws.

Note
We would recommend that you operate the boiler constantly at the required operating pressure. The boiler may still be operated at pressure, even if no heat demand occurs for a longer period of time. In systems comprising several boilers, of which one is constantly used as standby boiler, only change the operation over in longer intervals, e.g. during the annual inspection of the total system.

5692 729 GB

Further details regarding the individual steps (cont.)

System shutdown

⚠ ***Safety instruction***
Only open the water and steam connections and the inspection ports after the boiler has been completely depressurised.

1. Close the shut-off valves in the oil supply pipes (at the oil tank and filter) or the gas shut-off valve, whichever is applicable.
2. Switch OFF the burner and the feed water pump. Pull the connecting plug from the burner.
3. Isolate the system from the mains power supply.
4. Close all valves.

Information regarding system shutdowns
*If you do not require to use your boiler system **temporarily**, maintain the boiler water temperature by means of the thermostat (standby) at 95°C, to prevent corrosion through ingress of oxygen into the boiler water.*

If you want to shut down your heating system for longer periods of time (several months), shut it down completely.
- *Before taking the system out of use for longer periods, we recommend you take certain measures, e.g. protecting the system against frost or preserving the heating surfaces.*
- *Thoroughly clean the surfaces on the flue gas side to preserve the heating surfaces. Then conserve these surfaces with a preserving oil mixed with graphite.*
- *For the protection of the water side, we recommend you flood the boiler with degassed, oxygen-free and treated water with low salt content and added oxygen binders (e.g. sodium sulphite).*
  Then close the steam shut-off valve.
  Check the concentration of the oxygen binder at least every month and replenish, if necessary. When doing this, ensure that the binder is well-mixed with water inside the boiler.
- *Another option is that of dry preservation, which is recommended for shutdown periods longer than 4 weeks.*
- *When there is a **risk of frost,** drain the boiler and the heating system via the drain plug.*
  Open the shut-off and regulating valves as well as the air vents.

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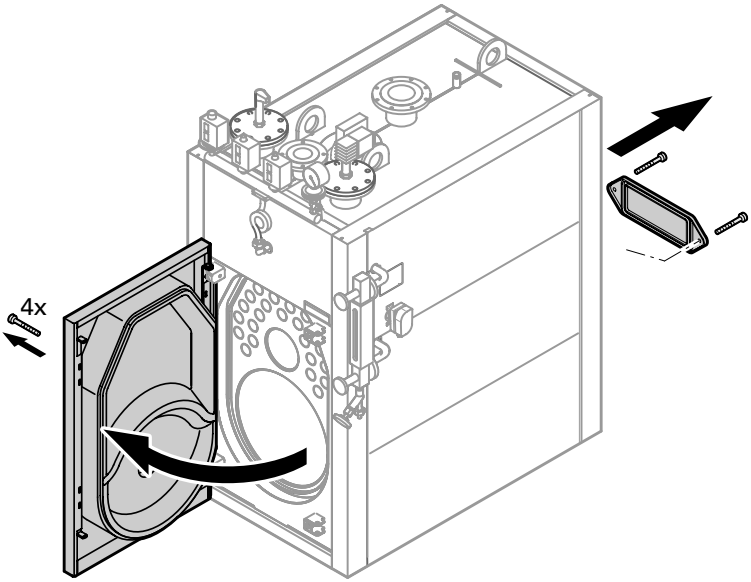
Further details regarding the individual steps (cont.)

Closing the Vitoair draught stabiliser (if installed)

1. Switch ON the burner.

2. Switch OFF the system, when pre-purge is running; this closes the control disc.

Opening the boiler door and the clean-out cover



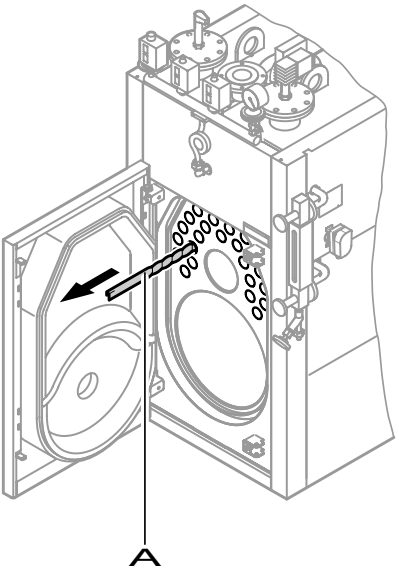
Note

Remove the gas supply pipe on gas burners.

5692 729 GB

Further details regarding the individual steps (cont.)

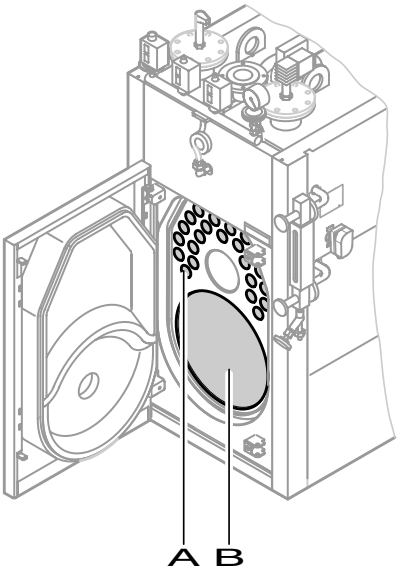
Removing and cleaning the turbulators



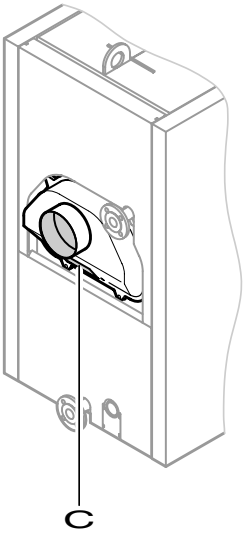
Remove turbulators A without force; for this, use the turbulator pulley, which is part of the cleaning equipment.

Further details regarding the individual steps (cont.)

Clean the heating surface, flue outlet and flue pipe



1. Clean flues A and combustion chamber B with brushes and remove combustion residues.



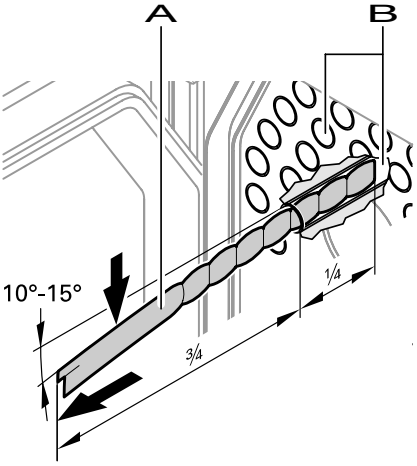
2. Remove combustion residues from the flue pipe and the flue outlet C.

5692 729 GB

Further details regarding the individual steps (cont.)

Inserting the turbulators

⚠ *Burner adjustments and specific system conditions can lead the turbulators to move forward, which may result in them being burnt. The thermal insulation on the boiler door can also be damaged by this.*



1. Pull approx ¾ of the length of turbulators **A** out of secondary heating pipes **B**.
2. Bend turbulators approx. 10-15°.
3. Insert the turbulators into the secondary heating pipes. When doing this, check the preliminary tension.

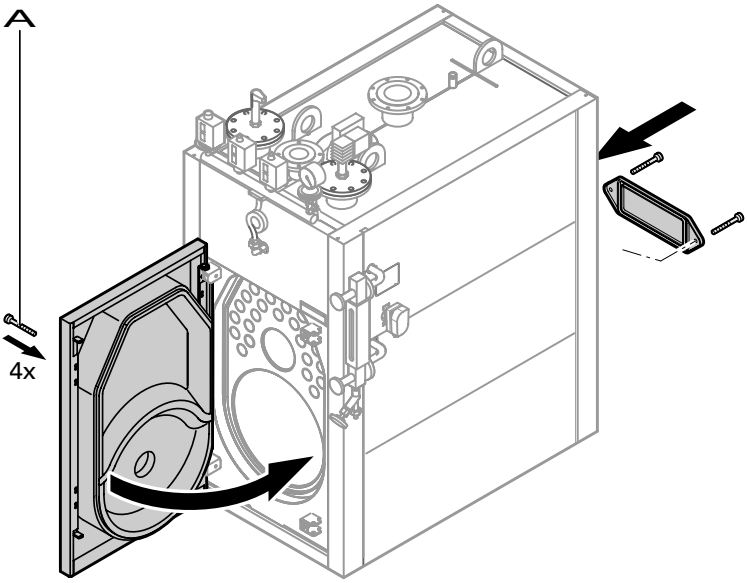
Note
Turbulators must not be able to be pulled from the secondary heating pipes easily.

Further details regarding the individual steps (cont.)

Securing the boiler door and clean-out cover

Note
Refit the gas supply pipe on gas burners.

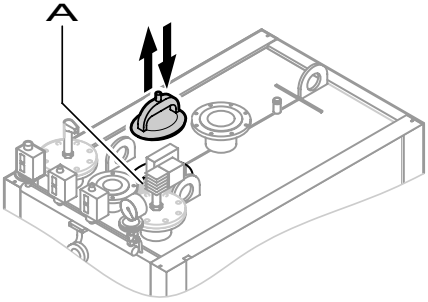
⚠ ***Safety instruction***
Carry out a leak test on all gas supply connections.



⩓ Tighten the screws diagonally.

Further details regarding the individual steps (cont.)

Checking the water chamber for deposits

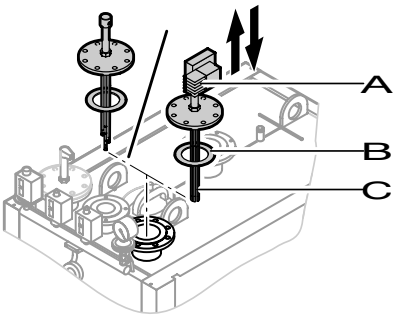


1. Open hand hole cover A.
2. Fully drain the boiler.
3. Clean the water chamber (hose it out) and remove deposits via the blow-down valve and drain. In case of harder deposits which cannot be removed by hosing down, carry out a chemical cleaning process using added descaler.
4. Clean all sealing faces on closures, and replace gaskets, where required. Retighten new gaskets after commissioning and recheck after 24 hours.

5692 729 GB

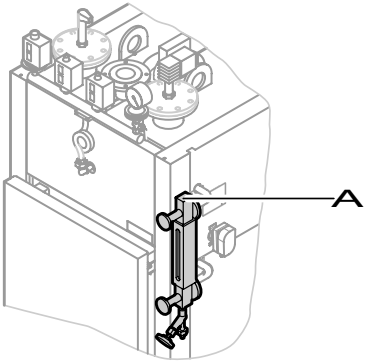
Further details regarding the individual steps (cont.)

Cleaning the multiple level electrode



1. Remove electrode A.
2. Clean electrode tips C.
3. Clean the sealing faces and use a new gasket B.
4. Install the electrodes and carry out a safety test in line with the manufacturer's instructions.
5. Retighten new gaskets after commissioning.

Cleaning the water level indicator

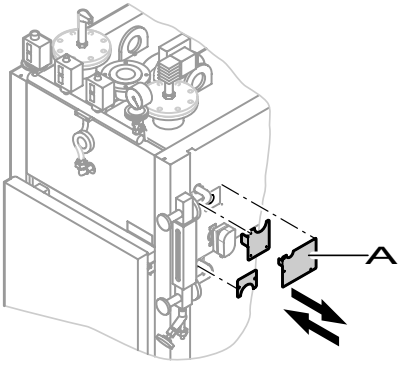


1. Blow out the water level indicator.
2. Remove upper plug A, and clean the water level indicator with a brush.

5692 729 GB

Further details regarding the individual steps (cont.)

Checking all connections at the water and steam sides, the sensor well and the inspection ports for leaks after filling the boiler

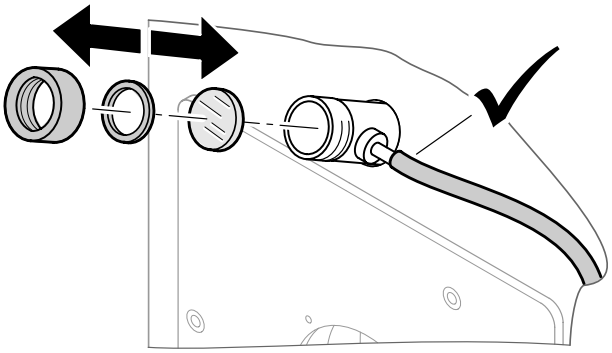


Each time inspection ports have been opened:

1. Clean the sealing surface.
2. Replace the gasket.
3. Retighten all connections after restarting the system.

For testing the sensor well, remove cover A.

Cleaning the sight glass in the boiler door



Check gaskets and hose connection for leaks.

Further details regarding the individual steps (cont.)

Checking the Vitoair draught stabiliser (if installed)

Release the latch on the control disc.
The control disc must swing freely during burner operation.

Adjusting the burner

Burner manufacturer's details

During adjustments, observe the minimum output.
Set the minimum heating output for the base load stage according to the chimney conditions.

Checking the safety valve

Manufacturer's details

Raise the operating pressure to the response pressure or manually vent when 85% of the response pressure has been reached.

Checking the pressure regulator, pressure limiter and thermostat (standby)

Check the pressure regulator, pressure limiter and thermostat (standby) for function and correct adjustment.

The control thermostat (standby) must be adjusted to a minimum of 95 °C.

Diagnostics

Fault/ system characteristics	Cause	Remedy
Burner does not start	No voltage	Switch ON the mains electrical isolator
	Safety chain activated	Check all safety equipment
	Burner fault indicator illuminates	Press the reset button at the burner control unit
	Fuel supply interrupted	Open the shut-off valves in the fuel supply line and filter
	Remedy other faults in accordance with the burner manufacturer's instructions	
Oxygen corrosion (water side)	Topping up with unsuitable water	Check water treatment system and injection equipment in accordance with VdTÜV [or local] guidelines
	Boiler is completely shut down every day	Switch to standby (95 °C) instead of a complete shutdown
Flue gas temperature too high	Heat transfer is reduced by contamination on the flue gas and water side	Clean the boiler
	Rated boiler output is exceeded	Check the rated burner output
	Turbulators missing or incorrectly installed	Carry out maintenance and installation in acc. with page 10 and 12
The safety valve blows down	Blow-down pressure is not identical with the system pressure	Check the operating pressure with a suitable pressure gauge
	Valve seat contaminated	Clean the valve seat
	Water trap pipe (upstream of pressure regulator) is clogged up	Clean pipes

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Diagnostics (cont.)

Fault/ system characteristics	**Cause**	**Remedy**
The boiler produces wet steam	The boiler water alkalinity is too high	Regularly blow down the boiler and install a desalination system, if required; treat water according to EN 12953. Dewater the downstream steam line.
	The water level is set too high	Check the boiler and feed water daily. Check the electrode length.
Steam knocking inside the boiler	The feed water does not enter via the feed water connector	Connect the feed water line to the correct connector
Steam knocking inside the condensate container	Check valve in the feed water line is missing or faulty	Install or clean the check valve (observe the flow direction)
	Faulty system condensate drain	Identify and repair the faulty drain
	U bends buckle	Reduce the steam pressure
The water level in the boiler is too high	The steam distributor above the boiler is insufficiently dewatered	Install a condensate drain

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Diagnostics (cont.)

Fault/ system characteristics	**Cause**	**Remedy**
Water level limiter switches OFF	The shut-off valve in the feed water line is closed	Open the shut-off valve
	No feed water in the condensate container	Check the mains water connection
	The feed water pump or water level control is faulty	Determine the cause for the fault on the water level control in accordance with the controller installation instructions
	Severe water level fluctuations through excessive alkalinity	Drain water from the boiler and the condensate container. If a desalination valve is fitted, increase the desalination rate. Refill with treated water. Blow-down more frequently. Check the water treatment system.

5692 729 GB

Parts list

When ordering spare parts
Quote the type and serial no. (see type plate) and the item no. of the required part (as per parts list). Obtain common parts from your local supplier.

Parts
001 Flue outlet (with item 003 to 005)
003 Packing 12 × 16 mm
004 Clean-out cover
005 Packing 10 × 10 mm
006 Door
007 Stud
008 Sight glass pack, comprising: Item 009 to 013
009 Hose
010 Sight glass closure
011 Sight glass (with item 012)
012 Seal ring
013 Hose coupling nipple
014 Gasket
015 Turbulator
017 Handle*1
018 Brush handle*2
019 Extension*1
020 Fitting assembly
022 Gasket for hand hole cover
023 Gasket
024 Gasket
025 Gasket
026 Gasket
027 Hose pack ∅ 18 mm
028 Insulating block
029 Insulating mat I
030 Insulating mat II
031 Pack GF 25 × 15 mm
200 Top front panel
201 Bottom front panel
202 Side panel
203 R.h. top side panel
204 Central side panel
205 Front r.h. rail
206 Front l.h. rail
207 Rear r.h. rail
208 Rear l.h. rail
209 Top rear panel
210 Rear mounting bracket
211 Rear bottom panel
212 Side panel cover
213 Rear panel cover
214 Cover vent hole
215 Front r.h. top cover
216 Front l.h. top cover
217 Front insulating mat
218 Rear insulating mat
219 Front insulating casing
220 Rear insulating casing*1
221 Fibreglass mat
222 Central side panel cover*2
224 Viessmann logo
225 Vitoplex 100 logo
226 L.h. central side panels

Wear parts
021 Cleaning brush

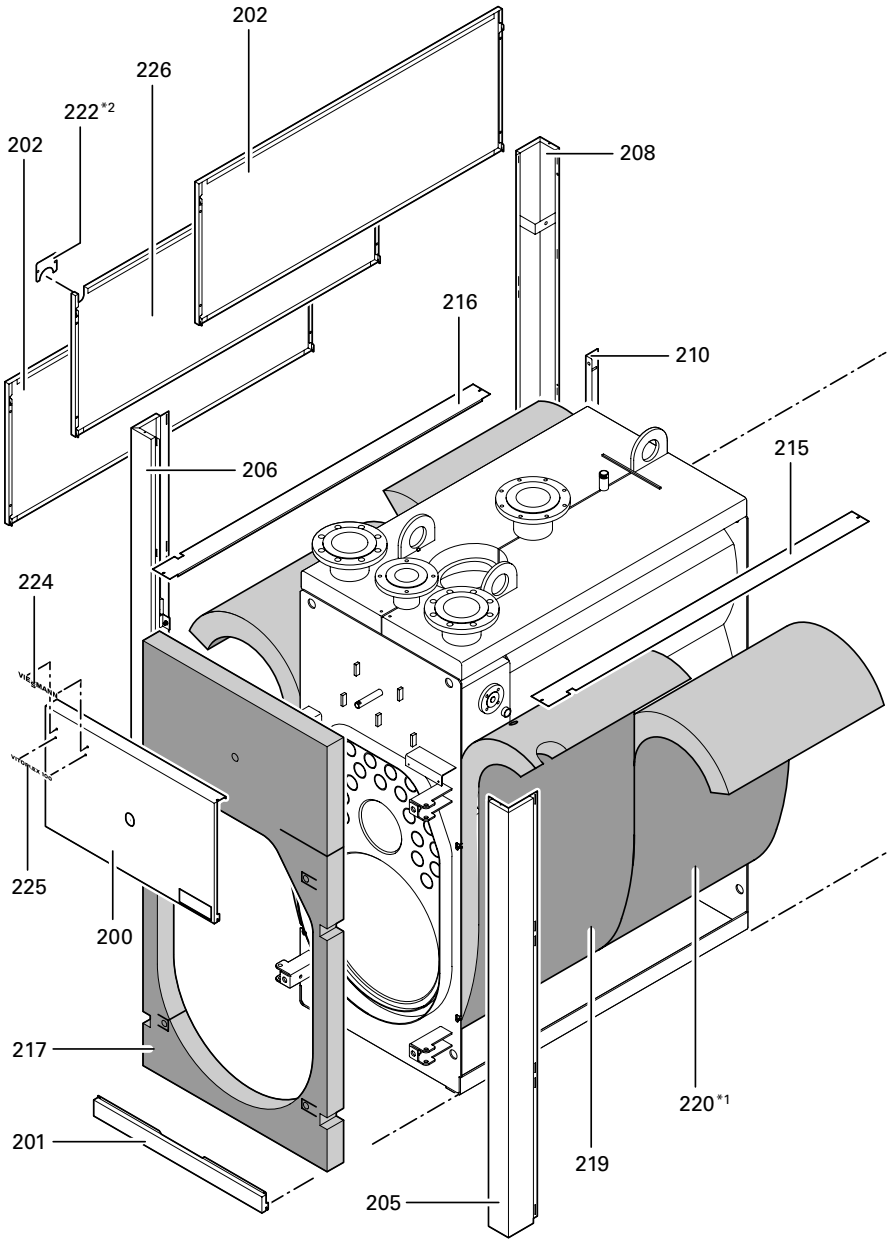
Parts not shown
300 Insulation pack
301 Touch-up spray, Vitosilver
302 Touch-up paint stick, Vitosilver
303 Decorative adhesive tape
304 Installation and service instructions
306 Installation instructions

A Type plate, optionally l.h. or r.h. side

*1 *Only for 700 kg/h.*
*2 *Only for 260 and 435 kg/h.*

5692 729 GB

Parts list (cont.)



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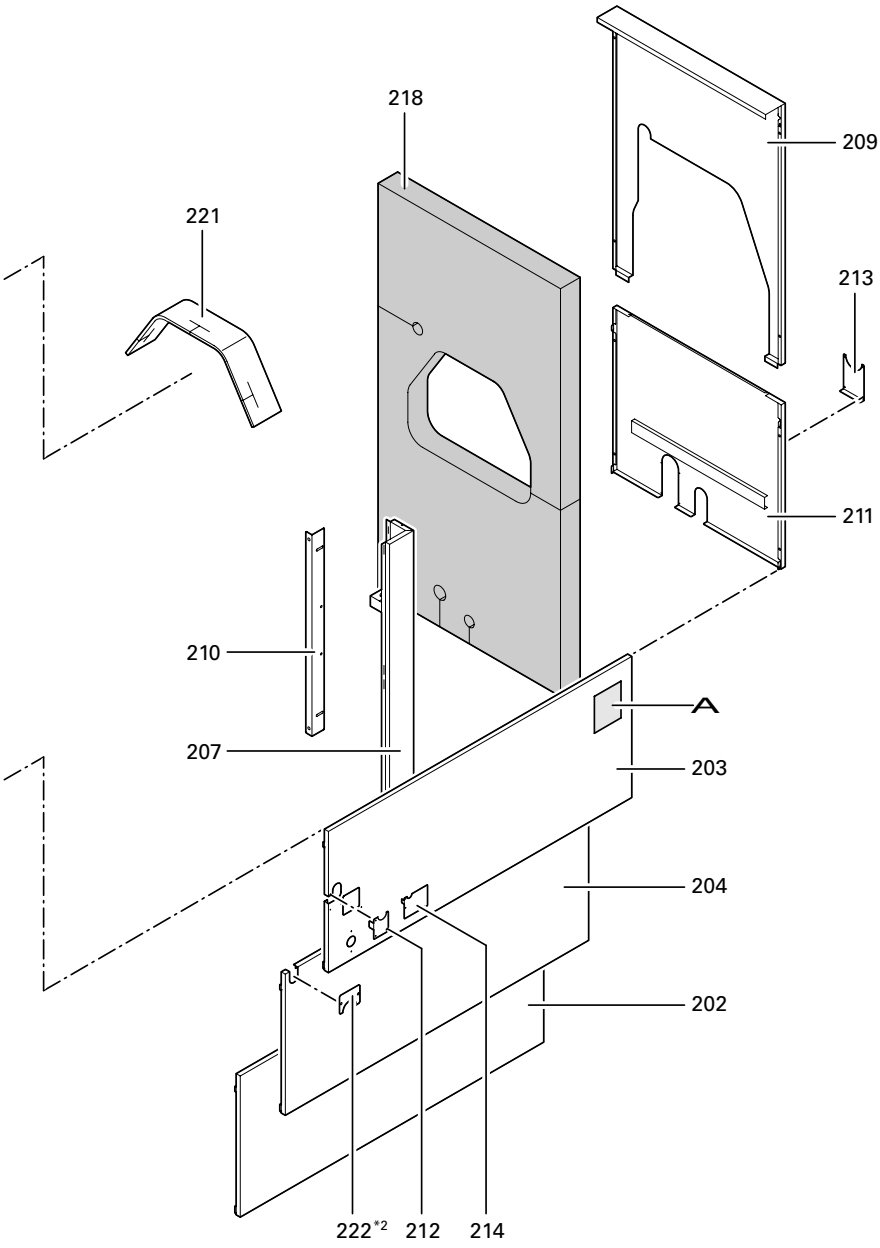

5692 729 GB

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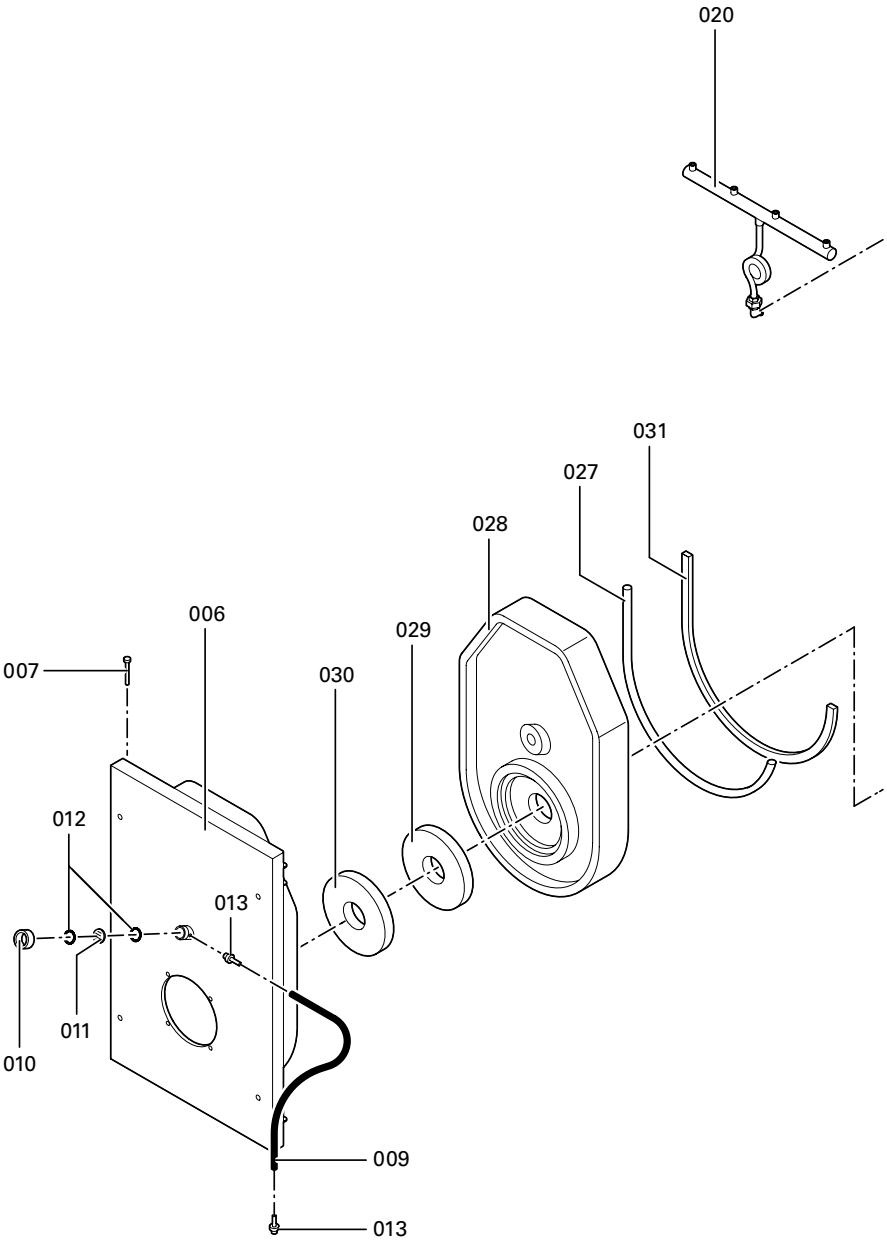

5692 729 GB

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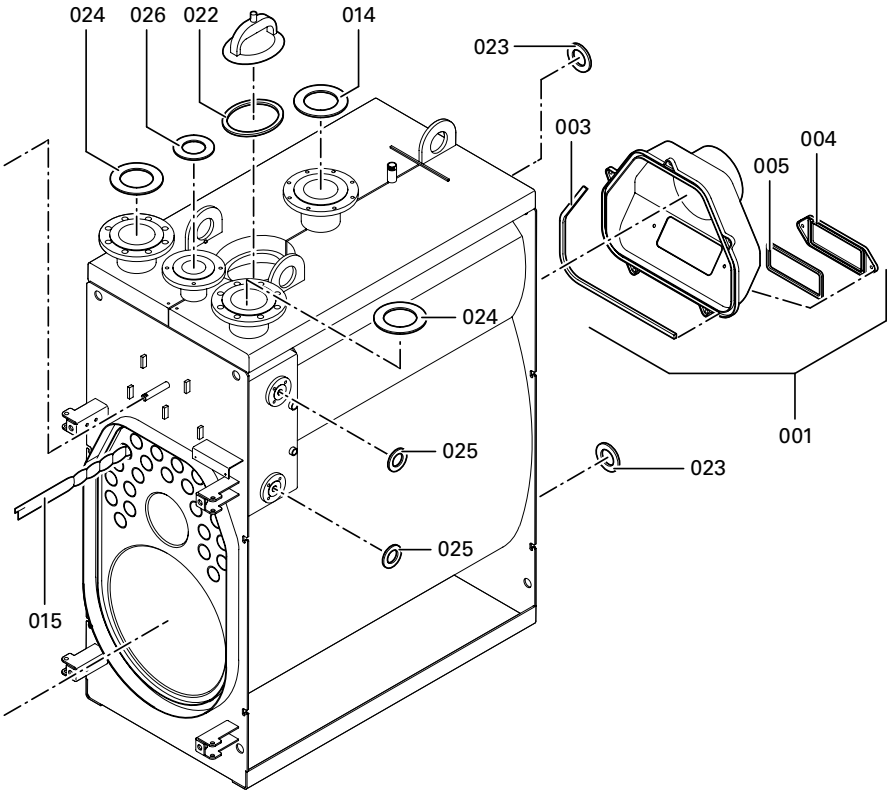

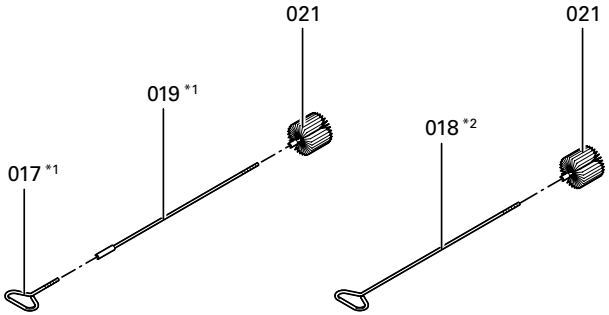

5692 729 GB

Water quality requirements according to TRD 701

For steam operation it is advisable to feed back as much condensate as possible to the feed water tank.
Treat the condensate with top-up water, so that the following conditions are maintained:

Boiler feed water requirements

General requirements		Colourless, clear and free from undissolved substances
pH value at 25 °C		> 9
El. conductivity at 25 °C	µS/cm	Only guide values applicable to boiler water
Total alkaline earths (Ca^{2+} + Mg^{2+})	mmol/litre	< 0.015
Oxygen (O_2)	mg/litre	< 0.1
Bound carbon dioxide (CO_2)	mg/litre	< 25
Free carbon dioxide (CO_2)	mg/litre	n. n.
Oxidisability (Mn VII → Mn II) as $KMnO_4$	mg/litre	< 10
Oil, grease	mg/litre	< 3

Boiler water requirements

General requirements		Colourless, clear and free from undissolved substances
pH value at 25 °C		8.5 to 10
Acid capacity up to pH 8.2 ($K_{S8.2}$)	mmol/litre	1 to 12
El. conductivity at 25 °C	µS/cm	< 5000
Phosphate (PO_4)	mg/litre	10 to 20

The addition of phosphate is recommended, but is not always essential.
Conversion:
1 mol/m³ = 5.6 °dH; 1 °dH = 0.1792 mol/m³; 1 mval/kg = 2.8 °dH

5692 729 GB

Specification

Steam output[*1]	kg/h	260	435	700
Rated output	kW	170	285	460
Flue gas values[*2]				
Temperature				
– at rated output	°C	200	200	200
– at partial load	°C	130	130	130
CE designation		CE-0035		

*[*1] at a feed water temperature of 80 °C.*

*[*2] Values for calculating the size of the flue system to DIN 4750 based on 13% CO_2 for fuel oil EL and 10% CO_2 for natural gas.*
Flue gas temperature measured at 20 °C combustion air temperature.

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Commissioning/service report

	Initial start-up	Maintenance/service	Maintenance/service
date:			
by:			

	Maintenance/service	Maintenance/service	Maintenance/service
date:			
by:			

	Maintenance/service	Maintenance/service	Maintenance/service
date:			
by:			

	Maintenance/service	Maintenance/service	Maintenance/service
date:			
by:			

	Maintenance/service	Maintenance/service	Maintenance/service
date:			
by:			

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Declaration of conformity

We, Viessmann Werke GmbH&Co KG, D-35107 Allendorf, declare as sole responsible body, that the product

Vitoplex 100 LS

conforms to the following standards:
EN 303
EN 50 082-1
EN 50 165
EN 55 014
EN 60 335
EN 61 000-3-2
EN 61 000-3-3
TRD guideline 2003/2

This product is identified in accordance with the following directives:
73/ 23/EEC
89/336/EEC
97/ 23/EC
This product is certified on the basis of the EC type test of the heated pressure vessel (certificate no. 01 202 620/B-042731-274-04 P) issued by the TÜV Rheinland/ Berlin-Brandenburg, 10882 Berlin, as follows:

CE-0035

Details according to the Pressure Equipment Directive (97/23/EC):
- Heated pressure vessel
- Class III/IV in accordance with appendix II, diagram 5
- Modules B and D according to appendix III
- Applied regulations: TRD
- Materials according to appendix I, 4.2, b) and TRD
- Anti-corrosion supplement according to appendix I, 2.2 and TRD

The pressure device was tested without equipment (safety equipment).
The pressure device must be equipped in accordance with current national requirements before installation and the initial start-up.
The pressure equipment meets the requirements of current TRD regulations in their amended form.

Therefore, the following test periods are suggested:
– annually: external test
– every three years: internal test and/or strength test designed as water pressure test.

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Manufacturer's certificate according to the 1st BImSchV

We, Viessmann Werke GmbH&Co KG, D-35107 Allendorf, confirm that the following product meets the NO_x limits specified by the 1st BImSchV para. 7 (2):

Vitoplex 100-LS

Allendorf, 8 March 2007

Viessmann Werke GmbH&Co KG

pp. Manfred Sommer

5692 729 GB

Keyword index

B
Boiler door and clean-out cover, opening, 9
Boiler door and clean-out cover, security 12
Burner adjustment, 17

C
Clean-out cover insertion, 12
Clean-out cover opening, 9
Commissioning/service report, 28
Completion notice, 3
Connections on water and steam side, checking, 16

D
Declaration of conformity, 29
Diagnostics, 18

H
Heating surface, cleaning, 11

F
Flue outlet and flue pipe, cleaning, 11
Further details regarding the individual steps, 5

I
Inspection ports, checking for leaks after filling the boiler, 16

M
Manufacturer's certificate, 30
Multiple level electrode, cleaning, 15

P
Parts list, 21
Pressure regulator and pressure limiter adjustment, 6
Pressure regulator, pressure limiter and thermostat (standby), checking, 17

S
Safety instructions, 2
Safety valve, checking, 17
Sight glass in boiler door, cleaning, 16
Specification, 27
Steps, 4
System shutdown, 8
System start-up, 7

T
Turbulator insertion, 12
Turbulator removal and cleaning, 10

V
Vitoair draught stabiliser, checking (if installed), 17
Vitoair draught stabiliser, closing (if installed), 9

W
Water chamber, checking for deposits, 14
Water level indicator, cleaning, 15
Water quality requirements, 26

5692 729 GB

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5692 729 GB Subject to technical modifications.

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